Metal & Nonmetal Activity Series

<u>Metals</u>

Lithium (Li^+)
Sodium (Na^+)
Potassium (K^+)
Rubidium (Ru^+)
Barium (Ba^{2+})
Strontium (Sr^{2+})
Calcium (Ca^{2+})
Magnesium (Mg^{2+})
Aluminum (Al^{3+})
Manganese (Mn)
Zinc (Zn^{2+})
Chromium (Cr^{3+})
Iron (Fe)
Cadmium (Cd^{2+})
Cobalt (Co^{2+})
Nickel (Ni^{2+})
Tin (Sn)
Lead (Pb)
Hydrogen (H_2)
Antimony (Sb)
Bismuth (Bi)
Copper (Cu)
Mercury (Hg)
Silver (Ag^+)
Platinum (Pt)
Gold (Au)

<u>Nonmetals</u>

Fluorine (F_2)
Chlorine (Cl_2)
Bromine (Br_2)
Iodine (I_2)

<u>Common Charges for Transition Metals</u>

Fe → +2, +3

Cu → +1, +2

Ag → +1

Hg_2 → +1, +2

Pb → +2, +4

Cd → +2

Zn → +2

Ni → +2, +3

Au → +1, +4

Co → +2, +3

Sn → +2, +4

Cr → +2, +3

Solubility Rules

1) Most nitrate (NO_3^-) and acetate ($C_2H_3O_2^-$) salts are soluble.
2) Most salts containing the alkali metal ions (Li^+, Na^+, K^+, Cs^+, Rb^+) and the ammonium ion (NH_4^+) are soluble.
3) Most chloride, bromide, and iodide salts are soluble. Notable exceptions are salts containing the ions Ag^+, Pb^{2+}, and Hg_2^{2+}.
4) Most sulfate salts are soluble. Notable exceptions are $BaSO_4$, $PbSO_4$, Hg_2SO_4, and $CaSO_4$.
5) Most hydroxide salts are only slightly soluble. The important soluble hydroxides are NaOH and KOH. The compounds $Ba(OH)_2$, $Sr(OH)_2$, and $Ca(OH)_2$ are only slightly soluble.
6) Most sulfide (S^{2-}), carbonates (CO_3^{2-}), chromate (CrO_4^{2-}), and phosphate (PO_4^{3-}) salts are only slightly soluble.

S = Soluble I = Insoluble – = Does not exist S/I = Partly Soluble D = Decomposes	Acetate	Bromide	Carbonate	Chlorate	Chloride	Hydroxide	Iodide	Nitrate	Oxide	Phosphate	Sulfate	Sulfide	
	$C_2H_3O_2^-$	Br^-	CO_3^{-2}	ClO_3^-	Cl^-	OH^-	I^-	NO_3^-	O^{-2}	PO_4^{-3}	SO_4^{-2}	S^{-2}	
Aluminum	S	S	–	S	S	I	S	S	I	I	S	D	Al^{+3}
Ammonium	S	S	S	S	S	S	S	S	–	S	S	S	NH_4^{+1}
Barium	S	S	I	S	S	S	S	S	S	I	I	S	Ba^{+2}
Cadmium	S	S	I	S	S	I	S	S	I	I	S	I	Cd^{+2}
Calcium	S	S	I	S	S	I	S	S	I	I	I	I	Ca^{+2}
Copper I (ous)	–	S/I	I	–	I	I	I	–	I	–	D	I	Cu^{+1}
Copper II (ic)	S	S	D	S	S	I	–	S	I	I	S	I	Cu^{+2}
Hydrogen	S	S	S	S	S	HOH	S	S	S	S	S	S	H^{+1}
Iron II (ous)	S	S	I	–	S	I	S	S	I	I	S	I	Fe^{+2}
Iron III (ic)	I	S	–	–	S	I	–	S	I	I	S/I	I	Fe^{+3}
Lead II (ous)	S	S/I	I	S	S/I	I	I	S	I	I	I	I	Pb^{+2}
Lead IV (ic)	D	–	–	–	D	–	–	–	I	–	–	–	Pb^{+4}
Magnesium	S	S	I	S	S	I	S	S	I	I	S	D	Mg^{+2}
Manganese	S	S	I	–	S	I	S	S	I	–	S	I	Mn^{+2}
Mercury I (ous)	S/I	I	I	S/I	I	–	S/I	S/D	I	I/D	I	I	Hg^{+1}
Mercury II (ic)	S	S/I	I	S	S	I	I	S	I	S/I	D	I	Hg^{+2}
Nickel	S	S	I	S	S	I	S	S	I	I	S	I	Ni^{+2}
Potassium	S	S	S	S	S	S	S	S	D	S	S	S	K^{+1}
Silver	S	I	I	S	I	–	I	S	I	I	S/I	I	Ag^{+1}
Sodium	S/I	S	S	S	S	S	S	S	D	S	S	S	Na^{+1}
Tin II (ous)	–	–	–	–	S	I	S	–	I	–	S	I	Sn^{+2}
Tin IV (ic)	–	S/D	–	–	S/D	–	S/D	–	I	I	S/D	I	Sn^{+4}
Zinc	S	S	I	S	S	I	S	D	I	I	S	I	Zn^{+2}